Answers to leftover chat room question from *M. Clara Wright's* Seedling Seminar presentation, March 18, 2015

Question:
Does the self-repair process occur when structure is under mechanical/thermal loading as in aircraft flight? The question is based on the notion of "strain evolution data" in the abstract.

M. Clara Wright:
The term "strain evolution" was meant to indicate the changes in strain accumulated in the material while it undergoes loading, unloading, and heating to repair. However, the repair process has only been performed on samples outside of any loading regime, that is, that they are not undergoing any additional mechanical or thermal loading during the repair step.

Question:
Does this method work well on other materials rather than shape memory alloys? How does temperature loading apply?

M. Clara Wright:
The finite element modeling was performed on different matrix and reinforcement materials, and as expected, when non-SMA materials were used for reinforcing the composite, there was no final crack closure (or repair). The concept requires the use of SMAs for composite reinforcement in order to exert a clamping force during the repair process. On a more general sense, the active clamping mechanism in the SMASH system is SMAs, however, it is possible to design structures using this concept with other active materials. For example, shape memory polymers could provide the same kind of closure force in a softer overall composite. Additionally, other active materials such as magnetostrictive materials could be considered. The key ability is to be able to trigger the material to provide closure forces and to provide a healing mechanism for the matrix material. Testing of the material has not included loading at temperature or thermal loading.